REMARKS

Claims 1-17 are currently pending in the subject application, and are presently under consideration. Claims 1-17 are rejected. Favorable reconsideration of the application is requested in view of the comments herein.

I. Rejection of Claims 1-5 and 12-13 Under 35 U.S.C. §103(a)

Claims 1-5 and 12-13 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Publication No. 2002/0135866 to Sasaoka, et al. ("Sasaoka") in view of U.S. Patent No. 6,363,087 to Rice ("Rice"). Withdrawal of this rejection is respectfully requested for at least the following reasons.

Claim 1 recites incorporating radially dependent amounts of dopant materials to provide a desired Raman gain coefficient profile that favors lower order modes and discriminates against higher order modes, and that light launched into an end of the fiber is subject to higher Raman gain along the optical axis, which promotes lower order modes and discriminates against higher order modes. In the Response to the Office Action dated March 13, 2007, Representative for Applicant respectfully submitted that Sasaoka does not disclose this element of claim 1 based on the teaching of Sasaoka of a uniform Raman gain coefficient as a function of wavelength and area. Specifically, Representative for Applicant respectfully submitted that, because Sasaoka discloses a fiber having a Raman gain coefficient of G_R/A_{eff} of 0.005 $(W*m)^{-1}$, Sasaoka does not teach or suggest incorporating radially dependent amounts of dopant materials to provide a desired Raman gain coefficient profile that favors lower order modes and discriminates against higher order modes, as recited in claim 1 (see, *e.g.*, Sasaoka, paragraph 26).

In the Office Action dated August 21, 2007 (hereinafter, "Office Action"), the Examiner agrees that Sasaoka discloses a Raman gain coefficient as a function of wavelength and area of G_R/A_{eff} of 0.005 $(W*m)^{-1}$ (Office Action, page 2). The Examiner proceeds to state that "this is only a minimum value," and that "it does not mean that the value is uniform across the diameter of the fiber," (Office Action, page 2). Representative for Applicant respectfully submits that there is no teaching or suggestion in Sasaoka to support the Examiner's assertion. Specifically,

there is no teaching or suggestion in Sasaoka that the Raman gain coefficient has higher values along the optical axis of the fiber.

To establish a prima facie case of obviousness, all of the claimed limitations must be taught or suggested by the prior art reference(s) (MPEP §2142; see, *e.g.*, *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). Representative for Applicant respectfully submits that it is insufficient for the Examiner to draw the conclusion that the minimum value of the Raman gain coefficient taught by Sasaoka does not mean that the value is uniform across the diameter of the fiber absent a teaching or suggestion in Sasaoka to the contrary. In other words, without a teaching or suggestion in Sasaoka that the Raman gain coefficient has higher values along the optical axis of the fiber, it is improper for the Examiner to assume that Sasaoka teaches that the Raman gain coefficient has higher values along the optical axis of the fiber based on the stated Raman gain coefficient being a minimum value.

Furthermore, as described above and conceded by the Examiner, the Raman gain coefficient disclosed by Sasaoka is a function of wavelength for a given area (Sasaoka, paragraph 26; see Office Action, page 2). Since the Raman gain coefficient is a static value for "a given area", as conceded by the Examiner, the Examiner's conclusion that it does not mean that the value is uniform across the diameter of the fiber is logically inconsistent. Specifically, the "given area" could encompass the optical axis, the entire core of the fiber, or a section of the fiber that does not include the optical axis. However, Sasoaka specifically teaches that the Raman gain coefficient is decreased only as a function of the amount of area, and not what or where that area of the fiber is. Specifically, there is no teaching or suggestion in Sasaoka that the "given area" in determining the Raman gain coefficient is specific to a particular portion of the fiber, or that particular portions of the fiber contribute differently to the Raman gain coefficient for the static value based on area. If Sasaoka did teach that the Raman gain coefficient was greater at the optical axis, the provided Raman gain coefficient would not just be dependent on a given area, but would be described as radially dependent (*e.g.*, via an integral with defined bounds from optical axis to core-edge). However, since Sasaoka fails to define the Raman gain coefficient in such a manner, the Raman gain coefficient taught by Sasaoka must be uniform

across the diameter of the fiber. Therefore, Sasaoka does not teach or suggest incorporating radially dependent amounts of dopant materials to provide a desired Raman gain coefficient profile that favors lower order modes and discriminates against higher order modes, and that light launched into an end of the fiber is subject to higher Raman gain along the optical axis, which promotes lower order modes and discriminates against higher order modes, as recited in claim 1.

In the Response to the Office Action dated March 13, 2007, Representative for Applicant also respectfully submitted that the single mode fiber of Sasaoka would not favor lower order modes and discriminate against higher order modes, as recited in claim 1, as the fiber of Sasaoka is capable of transmitting only a single mode. In the Office Action, the Examiner agrees that Sasaoka teaches a single mode fiber, but asserts that Sasaoka "motivates the use of a multimode fiber by incorporating Rice," and that "Sasaoka's doping, plus Rice's multimode fiber, gives the mode discrimination function," (Office Action, page 2). Representative for Applicant respectfully maintains the argument that the combination of Sasaoka and Rice do not teach or suggest favoring lower order modes and discriminating against higher order modes, as recited in claim 1.

As described above, Sasaoka teaches a single mode fiber, such that the fiber does not favor lower order modes and discriminate against higher order modes based on the transmission of only a single mode. In addition, Rice does not teach or suggest favoring lower order modes and discriminating against higher order modes, as recited in claim 1. Representative for Applicant thus respectfully submits that there is no motivation for one of ordinary skill in the art to combine the teachings of Rice with the teachings of Sasaoka to achieve a multimode fiber that favors lower order modes and discriminates against higher order modes. The refractive index profile of Sasaoka is taught by Sasaoka to affect chromatic dispersion, such that Raman amplification can occur more efficiently with less nonlinear optical phenomena deterioration (Sasaoka, paragraphs 26 and 27). The refractive index profile of Sasaoka does not, however, affect the favoring of lower order modes and the discrimination against higher order modes, as described above regarding the transmission of a single mode. Therefore, one of ordinary skill in

the art would not be motivated to combine the single mode fiber of Sasaoka with the multimode fiber of Rice to achieve the fiber recited in claim 1, as neither of the respective fibers of Sasaoka or Rice are taught to be designed with the aim of favoring lower order modes and discriminating against higher order modes, as recited in claim 1. Specifically, Representative for Applicant is left to wonder why one of ordinary skill in the art would implement a refractive index profile of a single mode fiber, as taught by Sasaoka, into a multimode fiber, as taught by Rice, to achieve a multimode fiber that favors lower order modes and discriminates against higher order modes when there is no teaching or suggestion in either reference for the possible occurrence of such an effect. Such a conclusion of the motivation to combine the fibers of Sasaoka and Rice, as asserted by the Examiner in the Office Action, must be a result of impermissible hindsight, such that the motivation takes into account knowledge gleaned only from applicant's disclosure." *In re McLaughlin* 443 F.2d 1392, 1395, 170 USPQ 209, 212 (CCPA 1971).

In the Office Action, the Examiner also states that "[t]he doping profile taught in fig. 1b [of Sasaoka] is radially dependent, and shows increased refractive index at the center point of the fiber," and states that the doping profile of Sasaoka is the same basic pattern as that described in the Present Application (Office Action, pages 3-4; citing Present Application, paragraphs 6 and 16). The Examiner also asserts that "[t]he Raman profile would inherently follow this pattern as well," (Office Action, page 3). Representative for Applicant respectfully submits that the Examiner has mischaracterized the teachings of Sasaoka. Nowhere does Sasaoka teach or suggest radially dependent doping. Instead, Sasaoka discloses that "[t]he core region is doped with GeO_2 in order to attain a refractive index higher than that of pure silica, whereas the first cladding region is doped with F element in order to attain a refractive index lower than that of pure silica," (Sasaoka, paragraph 22). FIG. 1B of Sasaoka demonstrates a refractive index profile, and not a doping profile. Accordingly, Representative for Applicant respectfully submits that it is inappropriate for the Examiner to state that it is inherent for the Raman profile to follow the pattern described by FIG. 1B, as such a statement is based on an incorrect interpretation of the teachings of Sasaoka. Representative for Applicant thus respectfully maintains that Sasaoka

does not teach or suggest a Raman gain coefficient profile having a highest value at the optical axis for the reasons described above.

For all of the reasons described above, neither Sasaoka nor Rice, individually or in combination, teach or suggest claim 1. Withdrawal of the rejection of claim 1, as well as claims 2-5, 12, and 13 which depend therefrom, is respectfully requested.

Claim 2 depends from claim 1, and thus should be allowed over the cited art for the same reasons as described above regarding claim 1. In addition, claim 2 recites incorporating radially dependent amounts of a dopant that affects the Raman gain coefficient, to provide a radially dependent Raman gain coefficient profile, and that the Raman gain coefficient has its highest value along the optical axis of the fiber. As described above regarding claim 1, Sasaoka and Rice, individually or in combination, do not teach incorporating radially dependent amounts of a dopant that affects the Raman gain coefficient, as recited in claim 2. The Examiner asserts that the Raman gain coefficient has its highest value along the optical axis of the fiber (Office Action, page 6; citing Sasaoka, FIG. 1B). Representative for Applicant respectfully disagrees. Sasaoka teaches a refractive index profile of the core and the first and second cladding of the optical fiber (Sasaoka, FIG. 1B; paragraph 23). However, FIG. 1B of Sasaoka is directed solely to a refractive index, and not to a Raman gain coefficient. Doping to achieve a desired refractive index profile and doping to achieve a desired Raman gain coefficient profile are unrelated concepts. In addition, as described above, Sasaoka teaches a uniform gain as a function of wavelength and area, and thus cannot teach or suggest a radially dependent Raman gain coefficient profile having its highest value along the optical axis of the fiber, as recited in claim 2. This argument was presented in the Response to the Office Action dated March 11, 2007, but was not responded to by the Examiner in the Office Action.

Furthermore, the language of claim 2 describes two separate dopants: radially dependent amounts of selected transparent oxides to provide radially dependent control of the refractive index, and radially dependent amounts of a dopant that affects the Raman gain coefficient to provide radially dependent Raman gain coefficient profile. The Examiner asserts that the claim does not make clear that the transparent oxides cannot perform both the function of doping to

affect the refractive index and doping to affect the Raman gain coefficient (Office Action, page 3). However, claim 2 does recite two separate dopants, and, as described above, to establish a prima facie case of obviousness, all of the claimed limitations must be taught or suggested by the prior art reference(s) (MPEP §2142; see, *e.g.*, *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). Since the Examiner has failed to demonstrate two separate dopants in the teachings of Sasaoka and/or Rice, one for radially dependent control of the refractive index and one for radially dependent control of Raman gain coefficient profile, Sasaoka and Rice, individually or in combination, do not or suggest claim 2. Withdrawal of the rejection of claim 2, as well as claims 3-5 which depend therefrom, is respectfully requested.

Claim 4 depends from claim 2, and thus should be allowed over the cited art for the same reasons as described above regarding claim 2. In addition, as described above regarding claim 2, Sasaoka does not teach a radially dependent Raman gain coefficient profile having its highest value along the optical axis of the fiber. Therefore, Sasaoka and Rice, individually or in combination, do not teach or suggest that the Raman gain coefficient profile has a generally parabolic shape with a peak coinciding with the optical axis of the fiber, as recited in claim 4. Withdrawal of the rejection of claim 4 is respectfully requested.

Claim 12 depends from claim 1, and thus should be allowed over the cited art for the same reasons as described above regarding claim 1. In addition, as described above regarding claim 1, Sasaoka teaches GeO_2 doping of the optical fiber core without any teaching as to non-uniformity of the amount of dopant material in the core of the optical fiber. Therefore, Sasaoka and Rice, individually or in combination, do not teach or suggest that the radially dependent amounts of dopant materials comprise a minimum amount of dopant material near an interface between the core and the cladding region with a gradual transition to a maximum amount at the optical axis, as recited in claim 12. Withdrawal of the rejection of claim 12 is respectfully requested.

Claim 13 depends from claim 1, and thus should be allowed over the cited art for the same reasons as described above regarding claim 1. As described above regarding claim 2, Sasaoka does not teach a radially dependent Raman gain coefficient profile having its highest

value along the optical axis of the fiber. Therefore, Sasaoka and Rice, individually or in combination, do not teach or suggest that the fiber is configured to provide higher Raman gain along the optical axis for multimode light launched into the fiber, as recited in claim 13. Withdrawal of the rejection of claim 13 is respectfully requested.

II. Rejection of Claims 6-9, 11 and 14-17 Under 35 U.S.C. §103(a)

Claims 6-9, 11 and 14-17 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Sasaoka and Rice in view of WO 02/50964 A2 to Clarkson ("Clarkson"). Withdrawal of this rejection is respectfully requested for at least the following reasons.

Claim 6 recites a fiber comprising a core having a longitudinal optical axis and incorporating radially dependent amounts of dopant materials to provide a desired refractive index profile and a desired Raman gain coefficient profile that favors lower order modes and discriminates against higher order modes. Claim 6 also recites that light launched into the fiber is subject to higher Raman gain along the optical axis, which promotes lower order modes and discriminates against higher order modes. As described above regarding claim 1, neither Sasaoka nor Rice, individually or in combination, teach or suggest incorporating radially dependent amounts of dopant materials to provide a desired refractive index profile and a desired Raman gain coefficient profile that favors lower order modes and discriminates against higher order modes, or that light launched into the fiber is subject to higher Raman gain along the optical axis, which promotes lower order modes and discriminates against higher order modes, as recited in claim 6.

The addition of Clarkson does not cure the deficiencies of Sasaoka and/or Rice to teach or suggest claim 6. Clarkson teaches a fiber-based optical source with a high power laser diode stack pump source shaped into an intense beam by focusing and light concentrating elements (Clarkson, Abstract). However, the combination of Sasaoka and Clarkson does not teach or suggest a core having radially dependent amounts of dopant materials to provide a desired Raman gain coefficient profile that favors lower order modes and discriminates against higher order modes, as recited in claim 6. Therefore, Sasaoka, Rice, and Clarkson, individually or in

combination, do not teach or suggest claim 6. Withdrawal of the rejection of claim 6, as well as claims 7-10 which depend therefrom, is respectfully requested.

Claim 7 depends from claim 6, and thus should be allowed over the cited art for the same reasons as described above regarding claim 6. In addition, as described above regarding claim 2, Sasaoka does not teach a radially dependent Raman gain coefficient profile having its highest value along the optical axis of the fiber. Therefore, neither Sasaoka nor Rice teach or suggest that the Raman gain coefficient profile has a generally parabolic shape with a peak coinciding with the optical axis of the fiber, as recited in claim 7. The addition of Clarkson does not cure the deficiencies of Sasaoka and/or Rice to teach or suggest claim 7. Accordingly, Sasaoka, Rice, and Clarkson, individually or in combination, do not teach or suggest claim 7. Withdrawal of the rejection of claim 7 is respectfully requested.

Claim 11 recites a method of generating a diffraction limited high brightness laser beam in a multimode fiber comprising providing a core with radially dependent amounts of at least one dopant that provides a Raman gain index profile with maxima coinciding with an optical axis of the fiber, and in the fiber, favoring the lowest order mode by providing maximum Raman gain along the optical axis, and discriminating against higher order modes. For substantially the same reasons as described above for claims 6 and 7, claim 11 should be allowed over the cited art. Withdrawal of the rejection of claim 11, as well as claims 16 and 17 which depend therefrom, is respectfully requested.

Claim 14 depends from claim 6, and thus should be allowed over the cited art for the same reasons as described above regarding claim 6. In addition, as described above regarding claim 1, Sasaoka teaches GeO_2 doping of the optical fiber core without any teaching as to non-uniformity of the amount of dopant material in the core of the optical fiber. Therefore, neither Sasaoka nor Rice teach or suggest that the radially dependent amounts of dopant materials comprise a minimum amount of dopant material near an interface between the core and the cladding region with a gradual transition to a maximum amount at the optical axis, as recited in claim 14. The addition of Clarkson does not cure the deficiencies of Sasaoka and/or Rice to teach or suggest claim 14. Accordingly, Sasaoka, Rice, and Clarkson, individually or in

combination, do not teach or suggest claim 14. Withdrawal of the rejection of claim 14 is respectfully requested.

Claim 15 depends from claim 6, and thus should be allowed over the cited art for the same reasons as described above regarding claim 6. In addition, as described above regarding claims 2 and 13, Sasaoka does not teach a radially dependent Raman gain coefficient profile having its highest value along the optical axis of the fiber and that the light that is pumped into the optical fiber is multimode light. Therefore, neither Sasaoka nor Rice teach or suggest that the fiber is configured to provide higher Raman gain along the optical axis for multimode light launched into the fiber, as recited in claim 15. The addition of Clarkson does not cure the deficiencies of Sasaoka and/or Rice to teach or suggest claim 15. Accordingly, Sasaoka, Rice, and Clarkson, individually or in combination, do not teach or suggest claim 15. Withdrawal of the rejection of claim 15 is respectfully requested.

Claim 16 depends from claim 11, and thus should be allowed over the cited art for the same reasons as described above regarding claim 11. In addition, as described above regarding claims 1 and 13, Sasaoka does not teach a multimode optical fiber and that the light that is pumped into the optical fiber is multimode light. Therefore, neither Sasaoka nor Rice teach or suggest that launching the pump power into one end of the multimode fiber comprises launching a multimode laser input into one end of the multimode fiber, as recited in claim 16. The addition of Clarkson does not cure the deficiencies of Sasaoka and/or Rice to teach or suggest claim 16. Accordingly, Sasaoka, Rice, and Clarkson, individually or in combination, do not teach or suggest claim 16. Withdrawal of the rejection of claim 16 is respectfully requested.

Claim 17 depends from claim 11, and thus should be allowed over the cited art for the same reasons as described above regarding claim 11. In addition, for substantially the same reasons as described above regarding claim 14, claim 17 should be patentable over the cited art. Withdrawal of the rejection of claim 17 is respectfully requested.

For the reasons described above, claims 6-9, 11 and 14-17 should be patentable over the cited art. Accordingly, withdrawal of this rejection is respectfully requested.

III. Rejection of Claim 10 Under 35 U.S.C. §103(a)

Claim 10 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Sasaoka, Rice and Clarkson, and further in view of U.S. Publication No. 2003/0161361 to Paldus, et al. ("Paldus"). Withdrawal of this rejection is respectfully requested for at least the following reasons.

Claim 10 depends from claim 6, and should be allowable for at least the reasons described above regarding claim 6. The addition of Paldus does not cure the deficiencies of Sasaoka, Rice, and Clarkson to teach claim 6. Paldus teaches a laser tuning mechanism that embodies spectrally dependent spatial filtering (Paldus, Abstract). However, the combination of Sasaoka, Rice, Clarkson, and Paldus, individually or in combination, does not teach or suggest a multimode fiber comprising a core having radially dependent amounts of dopant materials to provide a desired Raman gain coefficient profile that favors lower order modes and discriminates against higher order modes, as recited in claim 6, from which claim 10 depends. Accordingly, claim 10 should be patentable over the cited art. Withdrawal of the rejection of claim 10 is respectfully requested.

CONCLUSION

In view of the foregoing remarks, Applicant respectfully submits that the present application is in condition for allowance. Applicant respectfully requests reconsideration of this application and that the application be passed to issue.

Please charge any deficiency or credit any overpayment in the fees for this amendment to our Deposit Account No. 20-0090.

Respectfully submitted,

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